CONTRACT FILE

1 March 1961

MEMORANDUM TO: Chief, TISD

SUBJECT: Chemical System

1. On 29 April 1960, the undersigned prepared a report to Chief, TISD, the subject of which was chemical replenishment system for the new building. This report was written after having visited several photographic laboratories, both military and civilian, in order to become acquainted with the latest methodology and instrumentation. One fact was singularly peculiar to all of these installations. All of these laboratories were geared to a continuous operation involving the processing of photographic film in extremely large quantities and with more or less single-purpose solutions. These solutions were stored, piped to equipment, returned to storage, replenished, analyzed, and piped back into the system as a closed loop. This particular method seems to have many advantages only when there is a continuous requirement.

2. Based on past history and records of the photographic laboratory at NPIC, under DMD, there is virtually no requirement for a continuous film processing operation. The storage and replenishment of large quantities of photographic chemicals would appear to be uneconomical in an intermittent type operation. An alternative method is proposed. Since there are 5 basic ingredients to all photographic developers, namely: (1) A reducing agent; (2) An accelerator; (3) A restrainer; (4) A preservative; and (5) An alkali, it appears to be feasible to store these elements as possible saturating solutions (approximately 50 percent saturated). These single elements could be stored in 50 gallon stainless-steel containers and piped to a central 100 gallon mixing tank, into which the proper amounts of each of these elements could be mixed with water to compound an infinite variety of developer formulas. These developing solutions could then be piped to all processing stations through appropriate filters. The solutions would be used during their normal life and then discarded. A 300 gallon storage tank of film fixer and a 300 gallon storage tank of paper fixer could also furnish these chemicals to the proper processing stations. It might be advisable to return the film fixing agent to storage after silver recovery. The paper fixing agent would be discarded after use. Since the various developer formulas would be mixed from the saturated solutions of the basic elements, the cost per gallon would be only a fraction of the packaged developer solutions. For

instance, a 50 gallon batch of 50 percent saturated Metol or Elon would make more than 77,000 gallons of developer solution. These single solutions would be excellent keeping qualities and since the basic elements are already in solution, the formulas could be compounded quite rapidly and changed with only a few moments delay. Attached is a list of 5 well-known developer formulas for both paper and film with the amounts of the 5 basic ingredients tabulated.

3. In conclusion, this system has the following advantages: (1) A variety of developer formulas piped to processing stations through a single line; (2) Economy of operation; (3) Simplicity of design; (4) Low maintenance; (5) Immediate access; (6) flexibility in changing developer formulas. It is recommended that the undersigned be directed by the Chief, TISD, to continue this study and to prepare a final report in the form of a staff study. STATINTL

[redacted]

STATINTL PIC/TISD: [redacted]

COMPARISON OF STANDARD DEVELOPERS

		D-72 GRAMS	DK-50 GRAMS	D-76 GRAMS	D-19 GRAMS	D-11 GRAMS
1.	Elon	11.7	9.4	7.5	8.3	3.8
2.	Sod. Sulfite	170.3	113.5	378.5	362.4	284.1
3.	Hydroquinone	45.4	9.4	18.8	33.4	34.2
4.	Sod. Carb.	302.8	37.8	----	212.1	113.6
5.	Pot. Brom.	7.2	2.7	----	18.8	18.8